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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/719.065

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EXAMINER

KIM, PETER B

ART UNIT

PAPER NUMBER

2851

DATE MAILED: 11/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/719,065	<b>Applicant(s)</b> HUBERTUS MULKENS ET AL.	
	<b>Examiner</b> Peter B. Kim	<b>Art Unit</b> 2851	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 September 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11, 13-55 and 62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-19, 21-55 and 62 is/are rejected.
- 7) ☒ Claim(s) 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/866,875.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

Applicant's arguments filed on Sept. 5, 2006 have been fully considered.

#### ***Claim Objections***

Claims 17, 20, 31, 39 and 52 are objected to because of the following informalities:

Regarding claims 17, 20 and 52, "the at least one volume" of claims 17 and 20 and "the volume" of claim 52 seem to lack antecedent basis. It seems that the originally filed claim included, deleted term, "one volume" and "the volume" seems to be referring to the deleted term.

Regarding claim 39, "(H2o)" seems to be a typo. Regarding claim 31, "radiation radiation-energy" seems to be a typo. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 10, 11, 37, and 38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The gas entering the enclosure at the speed greater than the speed of sound is not adequately disclosed as to enable one of ordinary skill in the art.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 26-34, 36, 39, 41, 43, 44, 47, 48, and 52-55 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishi (6,545,746).

Regarding claims 26, 28, 34, 47, 48, 52-54 and 55, Nishi discloses a lithographic projection apparatus and a device manufacturing method comprising a radiation system (111) a support structure (112) for supporting a patterning structure, a substrate table (114), a projection system (113) and a radiation absorber comprising a gas supply to supply an absorbent gas at a controlled concentration in the evacuated optical path (col. 35, line 56 – col. 36, line 47), the absorbent gas absorbing radiation energy by increasing gas pressure (col. 35, line 56 – col. 36, line 47) to absorb radiation during exposure of the radiation sensitive material to the patterned beam to adjust one of: radiation power emitted by a radiation source configured to supply radiation to the radiation system; the uniformity of energy of the beam of radiation perpendicular to an optical axis of the apparatus; radiation energy of pulses of radiation emitted by the radiation source; duration of an exposure of a target portion; angular distribution of the radiation energy delivered by the beam of radiation (col. 35, line 55-60); and a radiation-energy detector or sensor proximate to the enclosure providing an output signal and energy profile that

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is proportional to an amount of interaction of the projection beam with the absorbent gas (col. 35, line 56 – col. 36, line 47, in order to control the control the amount of light and to obtain desirable amount, a detector must be provided. Also, see col. 17, lines 32-42).

Regarding claims 27, 41 and 43, Nishi discloses the radiation-energy detector or sensor located proximate one of a pupil plane, a plane of patterning structure, a plane of the substrate; a conjugate plane of the pupil plane; a conjugate plane of the patterning structure plane; and a conjugate plane of the substrate plane (Fig. 1 and 8, col. 17, lines 32-42, col. 28, lines 8-14).

Regarding claim 31, Nishi discloses the radiation-energy detector comprising an enclosure surrounding at least one volume and transparent to beam of radiation (Fig. 8 and 9, col. 28, lines 9-65, col. 32, line 46 – col. 34, line 60). Regarding claims 32 and 33, the projection system of Nishi discloses a first aperture to allow radiation to enter and a second aperture to allow radiation to exit (Fig. 8, 9, 12 and 13) and the absorption by gas is substantially located at the focal point (col. 32, line 46 – col. 34, line 60, col. 35, line 56 – col. 36, line 47). Regarding claim 36, Nishi also teaches gas extractor (Fig. 9, col. 35, line 56 – col. 36, line 47). Since any gas in an enclosure will eventually reach an equilibrium in concentration, the concentration of the gas in Nishi would be symmetric about the optical axis. Nishi also discloses controlling one of the property of the absorbent gas (col. 36, lines 1-43).

Regarding claims 29, 30, 39 and 44, Nishi discloses the absorbent gas comprising oxygen, helium and nitrogen (col. 36, lines 44-46, col. 45, lines 17-42), mixed with purge gas (col. 45, lines 17-67), and radiation comprising wavelength less than 365 nm (KrF and ArF col. 14, lines 6-20), and the detector, which detects ultraviolet light. Nishi discloses radiation-energy detector to determine energy of radiation passing through a region of interactive gas (col. 35, line

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56 – col. 36, line 47, in order to control the control the amount of light and to obtain desirable amount, a detector must be provided, thus such detector is inherent to the invention of Nishi).

Nishi discloses a concentration controlled volume of radiation absorbent gas to be traversed by the beam of radiation (col. 35, line 56- col. 36, line 47, and col. 45, lines 17-67). Nishi supplies and controls absorbent gas to effect a desired non-uniform attenuation (col. 35, line 56- col. 63, line 47, and col. 45, lines 17-67). Nishi discloses a device (w) manufactured according to the method above.

Claims 1-5, 7, 13-16, 19, 21, 22, 24, 25, 50, 51, and 62 are rejected under 35 U.S.C. 102(a) as being anticipated by JP 2003257822 (“822”).

Regarding claims 1, 2, 13, 14, 21 22, 50, 51 and 62, 822 discloses a lithographic projection apparatus and a device manufacturing method comprising a radiation system in evacuated path (20, IL, para 0019) a support structure (RS) for supporting a patterning structure (R), a substrate table (WS), a projection system (PL) and a radiation absorber comprising a gas supply to supply an absorbent gas at a controlled concentration (Fig. 1, 3, abstract and para 0004 and 0010), the absorbent gas absorbing radiation energy by increasing gas pressure (Fig. 1, 3, abstract, para 0010) to absorb radiation during exposure of the radiation sensitive material to the patterned beam to adjust one of: radiation power emitted by a radiation source configured to supply radiation to the radiation system; the uniformity of energy of the beam of radiation perpendicular to an optical axis of the apparatus; radiation energy of pulses of radiation emitted by the radiation source; duration of an exposure of a target portion; and angular distribution of the radiation energy delivered by the beam of radiation (Fig. 1, 3, abstract, para 0010); and the

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absorbent gas comprising one of oxygen, and helium, and hydrocarbons (Fig. 1, 3, abstract, para 0004, 0010, 0019, 0020, and 0043-48), mixed with purge gas (para 0043 and 0044), and radiation comprising wavelength less than 365 nm (abstract, para 0019), and the detector (305), which detects ultraviolet light. 822 discloses radiation-energy detector to determine energy of radiation passing through a region of interactive gas (Fig. 3, ref. 305, abstract,). 822 discloses a concentration controlled volume of radiation absorbent gas to be traversed by the beam of radiation (Fig. 3, abstract). 822 supplies and controls absorbent gas to effect a desired non-uniform attenuation (Fig. 3, abstract).

Regarding claims 3 and 19, 822 discloses the radiation absorber located proximate one of a pupil plane, a plane of patterning structure, a plane of the substrate; a conjugate plane of the pupil plane; a conjugate plane of the patterning structure plane; and a conjugate plane of the substrate plane (Fig. 3, abstract). Regarding claim 4, 822 discloses absorber comprising an enclosure surrounding at least one volume and transparent to beam of radiation (Fig. 3, abstract). Regarding claim 5, the projection system of 822 discloses a first aperture to allow radiation to enter and a second aperture to allow radiation to exit (Fig. 3, abstract). 822 also teaches gas extractor (Fig. 3, abstract). Regarding claim 15 and 16, since any gas in an enclosure will eventually reach an equilibrium in concentration, the concentration of the gas in 822 would be symmetric about the optical axis. 822 also discloses controlling one of the property of the absorbent gas (Fig. 3, abstract).

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Claims 26, 27, 30, 52, 54 and 55 are rejected under 35 U.S.C. 102(e) as being anticipated by Mori et al. (Mori) (2001/0030740).

Mori discloses a lithographic projection apparatus and a device manufacturing method comprising a radiation system with wavelength less than 365 nm (10 and para 0044) a support structure (107) for supporting a patterning structure (20), a substrate table (23), a projection system (21) and a radiation-energy detector or sensor (24) proximate to a conjugate plane of the substrate plane (Fig. 1) providing an output signal that is proportional to an amount of interaction of the projection beam with the absorbent gas (Mori discloses in para 0081, inert gas inside the projection system. Since there is some absorption of illumination light with inert gas, the illumination detected by the sensor 24 would provide an output that is proportional to an amount of interaction of the beam of radiation with the region of the gas).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi in view of Tanaka et al. (Tanaka) (2003/0020888).

Nishi discloses the claimed invention as discussed above; however, Nishi does not disclose radiation in the range of 5-20 nm and a detector to detect such radiation. Tanaka discloses providing EUV light to a lithographic apparatus (para 0187). Therefore, it would have



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been obvious to one of ordinary skill in the art at the time of the invention to provide EUV light and a detector to detect such light to the invention of Nishi in order to improve the resolution of the exposed pattern.

Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi in view of Kley (6,353,219).

Nishi discloses the claimed invention as discussed above; however, Nishi does not disclose the sensor comprises an electrode which is charged at a potential opposite to a charged particle to which it is sensitive. Kley discloses in col. 53, lines 31-56, a radiation energy sensor including an electrode and sensitive to a charged particle which is opposite in sign. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the sensor of Kley to the invention of Nishi in order to facilitate analysis of the output signal through the controller as taught by Kley in col. 53, lines 15-30.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned

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with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-7, 9, 13, 15-19, 21-26, 29, 31-34, 36, 39, 40-43, 47-55, and 62 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, and 5-23 of U.S. Patent No. 6,538,716 ("716"). Although the conflicting claims are not identical, they are not patentably distinct from each other because the current claims are broader and thus fully met by the prior patent. For example, 716 also claims a gas composition sensor which is not claimed in the current claims.

Claims 8, 14, 30 and 35 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 7, and 19 of U.S. Patent No. 6,538,716 (716) in view of Tanaka et al. (Tanaka). As indicated above 716 claims to an invention not patentably distinct from the current claims; however, 716 does not claim radiation in the range of 5-20 nm and in the range of less than 365 nm and a detector to detect such radiation. Tanaka discloses providing EUV light and ArF and KrF laser to a lithographic apparatus (para 0187). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide EUV light and ArF and KrF a detector to detect such light to the claims of 716 in order to improve the resolution of the exposed pattern.

***Response to Arguments***

Regarding claim 39, applicant argues that inert gases are not claimed (page 12 of applicant's response); however helium, neon, argon, krypton, xenon are inert gases. In fact, of all the inert gases in the periodic table of elements, only radon is not claimed. Nevertheless, the rejection is withdrawn because upon further review, it is determined that the inert gases, which are normally used as purge gases to purge absorption gases, absorb some radiation although at a quantity far less than absorption gases such as oxygen or ozone (see para 0058 of Poon 2002/0159042).

In response to arguments on page 12 of applicant's arguments, rejection of claims 1-11, 13-25, 50, 51, and 62 based on Nishi is withdrawn.

Regarding claims 26, 52, 54 and 55, applicant argues that there is no basis in fact and/or technical reasoning for the conclusion that Nishi discloses a radiation-energy detector and that it is likely that Nishi includes a pressure sensor. Nishi discloses in col. 35, line 56 – col. 36, line 47, specifically, col. 35, lines 56-58, "the amount of illuminating light is controlled by utilizing the absorption of illuminating light by a gas." Nishi also discloses in the same section, specifically, col. 36, lines 31-36, "[t]o increase the amount of illuminating light IL, the ozone concentration is reduced toward 3%, whereas to reduce the amount of illuminating light IL, the ozone concentration is increased toward 100%, thereby enabling the amount of illuminating light IL to be continuously controlled." Applicant argues that Nishi includes a pressure sensor, but the purpose here is to continuously control the illumination, and in order to continuously control the illumination, a radiation-energy detector is necessary. Applicant also argue that Tanaka fails to

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cure the deficiencies in Nishi; however, the examiner, as explained above, does not agree that Nishi has any deficiencies in respect to the claims.

Regarding the 28 columns between column 35 and column 63, in view of the fact that the last column of Nishi, including the claims, is column 58 not 63, there was clearly a typographical error. Upon review of the office action, col. 35, line 56 – col. 36, line 47 is cited many times through out the rejection, and it is clear that in this instance col. 63, line 47 should be col. 36, line 47. In the process of rejecting 62 claims, this examiner inadvertently typed “63” instead of “36.”

In response to applicant’s arguments on page 14, 102(e) rejection based on 822 has been changed to 102(a), and in response to applicants arguments on page 15-16, rejection of claims 26-34, 36-44, 47-49, and 52-55 based on reference 822 is withdrawn.

Regarding claims 1-5, 7, 13-16, 19, 21, 22, 24, 25, 50, 51, and 62, applicant argues that the reference does not disclose the absorbent gases; however, as stated in the rejection above, 822 does disclose absorbent gases.

Regarding the double patenting rejections, applicant’s arguments are unclear because the rejection clearly states that the claims of the current application are broader because the claims of the previous patent includes all of the limitation of the current claims and also includes a limitation which is not claimed in the current application. For example, claims 1 and 19 of the previous patent claim projection apparatus and a device manufacturing method comprising a radiation system, a support structure to support patterning structure, a substrate table, a projection system, and a radiation control mechanism responsive to gas composition to control the radiation energy, which is radiation absorber of claim 1 in the current application. Further,

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claim 5 of the previous patent claims an energy sensor, and claim 22 of the previous patent claims absorber gas of hydrocarbons. Claim 1 and 19 of the previous patent is narrower because those claims have a limitations not found in the claims of the current application, which is a gas composition sensor. Thus, the claims of the current application are broader and thus fully met by the prior patent.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Poon reference is cited as relevant to absorption property of inert gases.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter B. Kim whose telephone number is (571) 272-2120. The examiner can normally be reached on 9:00 AM - 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on (571) 272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read "Peter B. Kim", is positioned above the printed name.

Peter B. Kim  
Primary Examiner  
Art Unit 2851

November 19, 2006